

HANGAR ECHOES

EXPERIMENTAL AIRCRAFT ASSOCIATION
CHAPTER 168 DALLAS TEXAS

Finding Hidden Drag

by K. Truemper

Editors Note: Thanks to Klaus for providing this article. We are sure you will find this topic very interesting since the performance improvements due to drag reduction to Klaus's Zenith 601 HDS have been absolutely phenomenal.

For us low and slow fliers, it is convenient to consider the total drag of an airplane to be composed of parasite drag and induced drag. Parasite drag is the resistance produced by irregular surfaces. The airflow is disrupted by such surfaces and becomes turbulent. Bending of smooth airflows creates induced drag. It is easy to see the causes of parasite drag. For example, unfaired gear legs and external antennas are indicators. Induced drag is harder to identify. A sleek-looking airplane may have lots of induced drag and thus may not fly fast. This is a story about such hidden drag.

After Mel Asberry and I finished the Zenith 601HDS (N314LB) about four years ago, I made a number of modifications, such as moving the radiator into the cowl, to reduce parasite drag. The changes improved climb and cruise performance. Nevertheless, the plane still had some undesirable flight characteristics that I could not explain and hence could not work on.

(1) In cruise, the plane sometimes would fly fast in level flight. But when a slight turbulence or downdraft would force me to raise the nose just a bit, the speed

would almost instantly deteriorate and then stay at that lower value.

(2) When trimmed for power-off glide, the speed would fluctuate considerably when very small elevator adjustments were made. The sink rate was high regardless of glide speed.

(3) When loaded close to max weight, the plane would require a nose-up attitude for level flight that seemed much higher than I expected to be necessary.



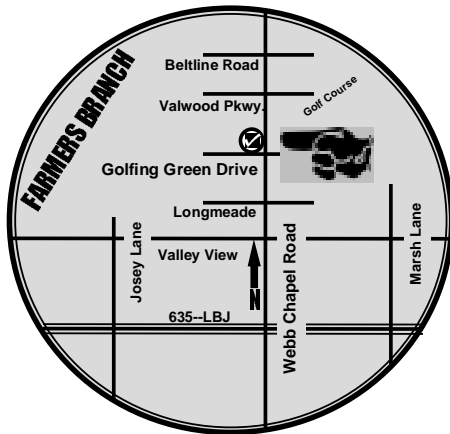
Since small changes in airplane attitude, particularly at low speeds, cannot cause large parasite drag changes, parasite drag could not be the culprit. That left me with induced drag. But how could induced drag do this? That question had me baffled for a long time. Then, after I solved the problem, I realized that the answer had been there

all along, in the shape of the RVs. So, don't expect anything new to be reported here. Any aeronautical engineer is well aware of what I am writing about. But, equally true, the simple facts I will describe have been ignored in some of yesterday's designs and are still being ignored in some of today's designs. There are notable exceptions, in particular the RVs. They are so fast and exhibit such nice behavior because attention has been paid to many things, among them the item I describe here.

Continued on page 7

April 4th Chapter Meeting

Our April 4th Meeting will be held at the Farmers Branch Library, located on the northwest corner of Webb Chapel and Golfing Green Drive. The meeting will be held in the auditorium and will begin at 6:30 p.m. and finish by 9:00.



The program will feature Ed Kolano, a test pilot and former flight instructor at the U.S. Naval Test Pilot School at Patuxent River, Md. Ed, who holds an advanced degree in aeronautical engineering, designed the EAA's *Flight Testing Techniques* course and wrote many flight review articles for *Sport Aviation* on aircraft like the *Seawind*, *STOL CH 801*, *Rans S12S* and the *Cozy MarkIV*. His flight experience includes dozens of homebuilt airplanes, Ultralights and rotary wing aircraft, as well as scores of military and general aviation aircraft. If you want to learn more about flight testing, don't miss this meeting.

April 8th Fly In

The fly-in for April 8th will be at Mesquite Metro Airport (HQZ). Meet at the open ramp south of the blue hangars. We are going to brown bag this own, so be sure to bring your lunch with you. We hope to see you there.



April 29th Cedar Mills Fish Out

On Saturday April 29 the McKinney Chapter is hosting a Fish Out at Cedar Mills Airport on Lake Texoma. They will catching the fish that will be cooked for the May Fish Fry. If you don't like fishing, the Fish Out also includes a lunch time fly-in. See page 4 for more details.

April 11th Director's Meeting

The April BOD meeting will be held on the 11th at the Farmers Branch Library meeting room starting at 7:00 p.m. The minutes of the Mar. 14th BOD meeting (recorded by David Cheek) are as follows:

Attendees: Ann Asberry, David Carter, David Cheek, Gene Spaulding, Bo Bauereis, Jim Quinn, Michael Stephan, Sam Cooper, Mel Asberry, Dick Flunker, Jerry Mrazek, Bill Barrett, Sid Smith, Ted Fontelieu, Jerry Bidle.

- Meeting on Apr. 4th is planned to have Ed Kolano discussing flight testing as the program. Backup is Larry Prenice, FSDO safety counselor.
- Speaker for May 2nd meeting to be Steve Staudt on Champion Aircraft products. Speaker for June 6, Tom Scott of Quikkit (Glass Goose).
- Fly-in on Apr. 8th to be at Mesquite, HQZ. Doug Cheek will host, lunch will be brownbag.
- Hangar Echoes newsletter assembly on Apr. 25th at Dick Flunker's house.
- April BOD meeting will be on the 11th.

General Discussion items included:

- The March 25th Young Eagles rally at Mid-Way Airport with Chapters 661 and 1246. Insurance forms were sent by FAX to EAA National and confirmed.
- April 29th Cedar Mills fishing for fish fry with the McKinney Chapter.
- We are looking for a person to help with the June Poker Run. Sam Cooper will make contact for Chapter 168.
- EAA National is offering some books and videos at half price. Items must be ordered through the Chapter.
- Farmers Branch Library Aviation day is May 13. Starting at 10 a.m., should be over by 1 p.m. We will need other members to help on this day.

April 25th Newsletter Assembly

The May issue of the Hangar Echoes will be assembled at the home of Barb and Dick Flunker, at 401 Hampton Dr. in Allen. If you need directions call Dick or Barb at 972-396-0018.

Upcoming Local Events

- May 13 – Farmers Branch Library Aviation Day for Children.
- May 20 – McKinney 1246 Chapter Fish Fry at TKI.
- June 17 – McKinney 1246 Chapter Poker Run at TKI.
- Nov. 11 – Dallas 168 Chapter Chili Cook-out.

Upcoming National Events

- April 9-15 – Sun 'n Fun Fly-in, Lakeland FL.
- July 26-Aug. 1 – AirVenture 2000, Oshkosh WI.
- Oct. 19-21 – Southwest Regional Fly-in, Abilene.

A Message from the President: Ann Asberry

April is approaching fast and we are leaving the “cold” winter months behind. I say “cold” with tongue in cheek as the weather has been very mild and lots of good flying days were enjoyed by all. We in Texas are sure more fortunate than our fellow flyers up north.

With that all said we are looking forward to some great flying events in the next three months. Here are few for you to mark on your calendars. I hope many of you will participate.



- April 8 is the Chapter fly-in at Mesquite Metro. Bring your own sack lunch. We are planning a fun activity for the get-together.
- April 15th is the date for a fly out to Tulsa, OK with Chapter 1246 to visit an engine rebuilding shop.
- April 9th through the 15th is Sun N’ Fun 2000 in Lakeland, FL.
- April 29th, Cedar Mills at Lake Texoma, is the fly-in/fish-outing to prepare for the May fish fry.
- May 20th, fish fry at McKinney airport with Chapter 1246.
- June 17th is the poker run and hamburger lunch at McKinney airport with Chapter 1246.

In June we have two possible dates, the 10th or 24th, for our Chapter overnight weekend fly-out to Galveston. This is going to be lots of fun for everyone that can attend. We are inviting Chapter 1246 at McKinney and 323 at Sherman to join us.

Another special event in the works is something our former President, Jerry Mrazek, is putting together. It is a way to show the Farmers Branch Library and the surrounding community how much our Chapter appreciates using their facility every month. Jerry calls it “Aviation Day at the Library”. It is for children and will demonstrate many things about airplanes, education for aviation careers, and books. Some fun activities are planned and we need a number of volunteers for that day, Saturday May 13th. You will hear more about this at the next meeting. And speaking of this, I need to gather photos of various airplanes in the Chapter for a display. Please bring me a photo of your plane to the next meeting. There are no restrictions on what, or the size of the photo. Just be sure to write your name on the back so I can return it after the event.

EAA National is offering a special (April and May) ½ price sale on all videos and books from the catalog. This is a Chapter offer only and cannot be done individually or over the web. I will have the catalog at the next meetings for anyone to browse. We will take all orders and money and send it off as a single input each of the two months.

Thanks to the new elected Board of Directors. Please give them your support and as always, we are open to all suggestions from the membership on any issues and meeting topics. Remember that this is YOUR Chapter. It is only as good as what you put into it.

Happy Flying!
Ann

Funding for the Frontiers of Flight Museum

By Gene Spaulding

The President of the Frontiers of Flight Museum and one of our EAA Chapter 168 members last week announced to the aviation community and to the press that the FOFM had received a \$7.2 million grant from the State of Texas for the Museum. Jan Collmer had received a commitment from the City of Dallas to donate the land at the SE corner of Love Field (Lemmon-Mockingbird) if the museum could raise the money. When the grant was finally received Jan and Senator Kaye Bailey Hutchison (Chairwoman of the Museum) went to the City Council meeting and requested an ordinance for the Land for the Museum. For the first time any veteran council attendee could remember the item passed without one dissenting vote. The Museum has, in addition to the artifacts on display in the cramped quarters at Love Field, a major collection of priceless literature including all the files from Air America, all of General Jimmy Doolittle's files and artifacts and Admiral Lilenthals files on the American dirigibles (Akron, Macon). In addition there is a quantity of aircraft of various vintage in storage around the country that have been given or loaned to the facility on the condition that the building will be built.

Jan Collmer, in addition to flying very active air show schedule around the country, is President and CEO of Collmer Semiconductor and travels the world looking after his customers. Jan formerly was also on the Board of DFW Airport. Any time you think you are too busy to volunteer for any cause on behalf of anything you enjoy look at Jan.

April 29th Cedar Mills Fish Out

Michael Stephan

We need fish for the McKinney Chapter Fish Fry in May. So, Roy Matheny, a member of the McKinney Chapter, is coordinating the "Fish Out at Cedar Mills" for April 29th. The group will meet next to the runway, and, the fishing will begin at 7:30am. You must have your airplane on the ground before 7:30. Fishing will end about noon and lunch will begin. If you don't like to fish, you can still fly in for lunch. If you plan to fish, you will need a fishing license, which can be bought at the marina for \$7.

Roy has lined up a few boats, but says he needs a few more. He has also rented a few of the cabins next to the Cedar Mills runway for those who wish to get there Friday night or those who are bringing their boat Friday night. If you plan on going there Friday and want a space in the cabins, call Roy and confirm it with him.

If you plan on fishing, have any questions, or need directions call Roy at 972-727-2600.

AEROMILLER

Bruce Miller, Flight Instructor
Airplane, Glider, or Tailandrager
Box 547, Prosper, TX 75078
(972) 346-2831

Stocks, Bonds, Mutual Funds,
Financial Planning



E.G. "Bo" Bauereis
VICE PRESIDENT

8333 DOUGLAS AVENUE
SUITE 400, L.B. 82
DALLAS, TEXAS 75225
(214) 987-5222
MEMBER MIDWEST STOCK EXCHANGE

Triple "S" Machine & Fabrication

Single piece machine work
and heliarc welding a specialty

2203 Trinty Springs
Carrollton, Texas 75006

Sid Smith
Phone 972 418-9717

ProSourceTM
Wholesale Floorcovering

J.E. Red Marron

3235 Skylane
Suite 125
Carrollton, Texas 75006

(972) 250-4040
Fax (972) 250-6615

Humor from AvWeb

Last Friday I had the pleasure of taking a co-worker for a ride in a Cessna 152 after a very long workweek. She had never flown in a general aviation aircraft before, was curious about everything, and made some interesting observations that those of us who are around light planes regularly don't think about any more. I made my way through the preflight inspection, called "Clear!" and the engine growled to life.

"Sounds like a lawn mower," my companion observed.

She obviously mistook my look of interest in her perspective as one of being insulted.

"Well, a big one," she said.

Free BBQ Lunch at Air Park

Michael Stephan

Air Park (F69) is hosting a Barbeque Lunch on Saturday April 1st from 11:30 to 1:30. The lunch will be outside the Clubhouse, which is on the west side of the north end of the runway. This will be rain or shine, so if it is raining, drive in and look for the lunch to be inside a hangar. If you want to, you can bring a desert to supplement the BBQ.

Be sure to be in contact with Addison Tower when arriving since Air Park is near the airport, but if you can't reach the tower, monitor the frequency and come on in.

If you plan on attending please RSVP to Tina Bown at 972-447-0535 so she can get an approximate head count. But if you decide at the last minute, you are still welcome.

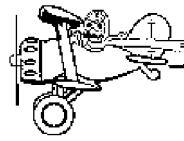
Addison Tower: 126.0
Addison ATIS: 133.4

HEADQUARTERS FOR SPORT AVIATION PARTS & MATERIALS

- * POLY-FIBER AND CECONITE COVERING
- * STEEL & ALUMUNUM TUBING * ALUMINUM
- * AIRCRAFT PLYWOOD * HARDWARE & MORE

ALPHA AVIATION SUPPLY CO.

P.O. BOX 8641 GREENVILLE, TX
903-527-3817



**Live With Your Plane
At Beautiful
Hidden Valley Airpark**

- 260-Acre Residential Airpark near Lewisville Lake
- 79 Homesites, 57 with homes/hangars on paved roads
- 2,000 foot paved runway with sod overrun (5TX0)
- 25-acre horse pasture, private entrance road and lake
- 30 minutes from Dallas or Fort Worth, 5 minutes to mall
- Only five 1-acre-plus lots available (940) 321-3817



Engines

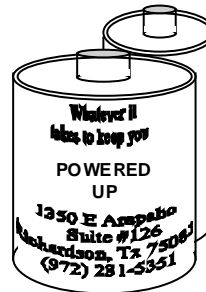
BOBBY'S PLANES 'N PARTS INC.
9061 F.M. 1885
WEATHERFORD, TX 76088-1445

BOBBY OSBORN

Tel. 940-682-4220
Fax 940-682-4264

CAMCORDERS - LAPTOP - CELL PHONES - LITHIUM - CUSTOM BATTERY PACKS

NICADS - NICKEL - METAL HYDRIDE - TEST EQUIP



**Batteries for your
portable world.**
EVS Supply

www.evssupply.com
1-800 776-5267
E-MAIL: BATTMEN@SPRINTMAIL.COM
battmen@sprintmail.com

SEALED LEAD BATTERIES - CHARGERS - WATCHES

Fountainhead Pools

INCORPORATED

BILL PRICE

SWIMMING POOL CONSTRUCTION * REMODELING * SERVICE

8024 Forest Lane
Dallas, Texas 75243

214/348-1505
Fax: 214/348-1563

Mark Steffensen and RV-8A

By Marvin Brott

On Sunday March 19th I made the trip to up to Allen to see Mark Steffensen's RV-8A project. Don Christiansen and Owen Bruce have spent some time looking over Mark's work and have both commented on how good it looks. It does look good. Mark initially started a RV-4 several years ago but really didn't get past the tail. Now



he has this RV (kit assembled) nearly ready to go to the airport, hopefully sometime in June. It has a recently overhauled IO-360 200 hp Lycoming and c/s prop from a Mooney. The panel has the standard six centered in the middle with the avionics across the bottom. Based on my article on "Thoughts on Panel Planning", in last months Hangar Echoes, Mark's panel is in the category of "where's my camera, I gotta get a picture of this". Finally I pride myself in keeping on top of all the building information concerning RV-8s from any number of sources but Mark really caught me off guard with a new push-rod assembly that is available from Vans to stop a rubbing problem. Bottom line, it never hurts to have another inspector look at your airplane and it never hurts to look at other peoples work for new and good ideas. The editors will keep you posted on this project.

D.E. CHRISTIANSEN, D.O., P.A.

Family Medicine
Aviation Medical Examiner



Office (972) 298-6174
Ans. Service (214) 521-4111

222 S. Cedar Ridge
Duncanville, Texas 75116

Office Hours By Appointment

A Great Day at Mid/Wae

By Michael Stephan

On Saturday March 25th, we had a very successful Young Eagles event. A total of 59 kids enjoyed their first ride. The event could be summed up by the words of a young girl who after getting out of the airplane said, "It was fun! It was fun!" We thank all those who helped especially Jim and Jane Quinn, who took the lead and made sure that every Young Eagle received a ride, Chuck Ferry and the CAP, who helped with the ground ops. We also extend our gratitude to the pilots who volunteered their time and planes:

Chapter 168

Don Christiansen
David McCutchen
Ted Fontelieu
Richard Robbins

Chapter 661

Don Vasquez
Blaine Ferguson



The GLASS GOOSE

By Quikkit



Office:
9002 Summer Glen
Dallas, TX 75243
214 - 349 - 0462
(Phone and Fax)

Tom Scott
General Manager

Plant: Lakeview Airport
Lake Dallas, TX 75065

Hidden Drag

Continued from page 1

We need a basic understanding of why airplanes fly. D. Anderson and S. Eberhardt have written an excellent article on this in the February 1999 issue of Sport Aviation, "How Airplanes Fly." Another illuminating article is "Foiled by the Coanda Effect" by J. Raskin in the September/October 1994 issue of Quantum. Briefly, a flowing liquid or gas tends to follow a smooth surface. You can convince yourself of this as follows. Hold a spoon rather loosely as shown in Figure 1 so that the water running from a faucet flows around the bowl of the spoon.

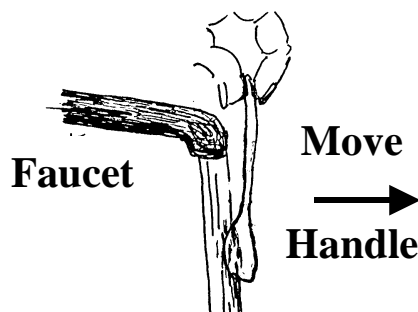


Figure 1. Demonstration of Coanda Effect

Try to move the spoon away from the flowing water as indicated in Figure 1. As you will see, the spoon bowl wants to stay with the flowing water and separates from it only when a surprisingly large force is applied. In the case of the wing of an airplane, the air moving over the top surface of the wing follows the downward slope. See Figure 2.



Figure 2. Airflow over Wing

The air continues the downward movement once it reaches the trailing edge. In effect, the wing pitches the air past the trailing edge at a downward angle. The action of the downward pitching of air creates as reaction a lifting of the wing. This interpretation is beautiful for understanding why airplanes fly. But it does not help much to see what is wrong when a plane does not fly well. For this, one may look at the air pressure above the wing. The air flowing above the wing is effectively bent downward. There is only one thing that could cause such bending: a low pressure above the wing. That low

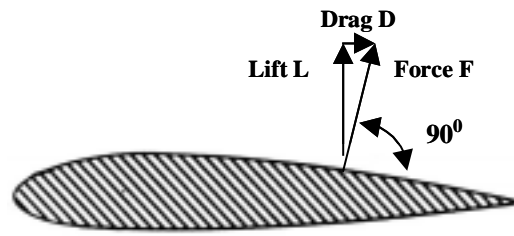


Figure 3. Force F, Lift L, & Induced Drag D

pressure produces a force F that, when depicted as a vector, rises at a 90° deg angle from the top surface of the wing. See Figure 3

Assuming level flight, gravity is the only force to be counteracted by the lift of the wing. Hence, the required lift L , which is opposite to and of the same magnitude as the gravitational force acting on the plane, is vertical. If the force F is to produce the lift L , it must be somewhat larger than L , as shown in Figure 3. In fact, the vertical vector L and the horizontal vector D must together, in vector addition, give the slanted vector F . The force D is the induced drag of the wing. When D is multiplied by the speed of the plane, and when that product is divided by the propeller efficiency, say 65-70%, one gets the horsepower required to overcome that induced drag.

Thick wings produce more induced drag than thin wings if they create the same lift using the same angle of attack. See Figure 4. Of course, thin wings require a faster airflow than thick wings to achieve that same lift.

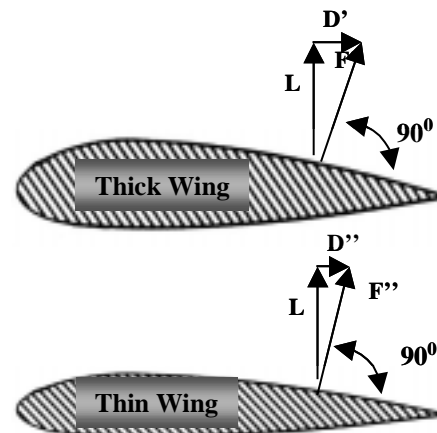


Figure 4. Effect of Wing Shape on Induced Drag

Induced drag is also produced by other parts of the airplane: for example, by the fuselage, by the fairing of the landing gear, and by the tail surfaces. Here we look at just one item, the fuselage.

Suppose a plane looks from above as shown in Figure 5, as does the 601HDS.

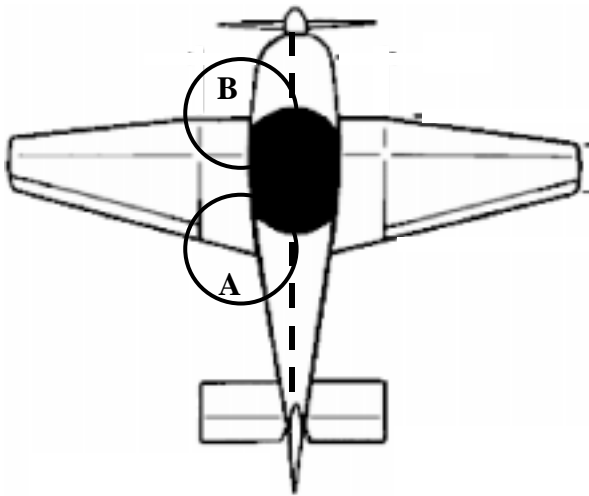


Figure 5. Areas A and B of Fuselage and Wing

Doesn't the fuselage look a bit like the cross-section of two wings put together at the dashed line? This means that the airflow along the fuselage in the area A produces forces F, L, and D shown in Figure 6.

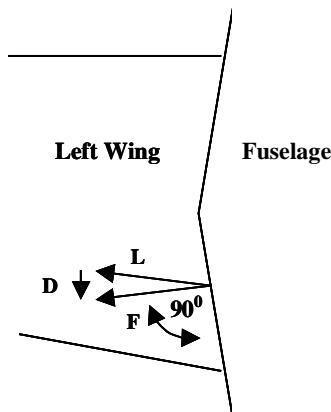


Figure 6. Forces Produced by Fuselage in Area A

The force L tries to pull the fuselage to the left. It is counteracted on the right-hand side of the fuselage by an opposite force of equal magnitude, and thus accomplishes nothing. The force D is induced drag, just as in the wing situation. Near the wing root, both the wing and the fuselage produce low pressure, and thus the induced drag D shown in Figure 6 is larger than if we removed the wing and exposed just the fuselage to the airflow. To get an idea of the magnitude of D in the case of the 601HDS, I made some differential-pressure measurements using Les Palmer's water-column gauge. That instrument is nothing but some clear plastic tubing, a small strip of wood with inch markings, and two plugs that cap the two ends of the tubing except that they have a few very small

holes. See Figure 7. By the way, that instrument is helpful when one wants to determine the location of an oil cooler or water radiator and the related ducting of air, or when one wants to find out why an existing oil cooler or water radiator is not working well. I used it extensively during the redesign of the cooling system for the 601HDS.

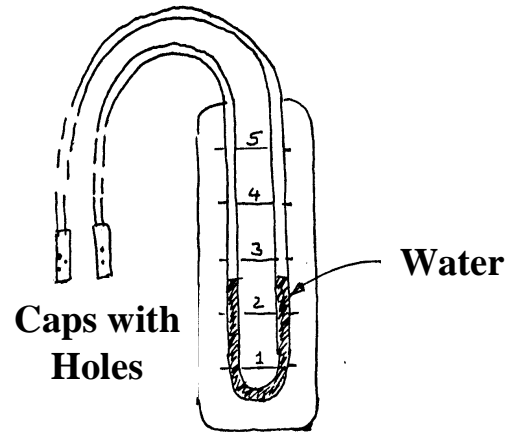


Figure 7. Water-Column Gauge

One probe was inside the cockpit. The other one was placed at various points on the outside sidewall of the fuselage. From these measurements, I estimated the induced drag caused by the bulging-out of the fuselage over the wing during climb and level flight. Using 100 kts as reference speed and a guess of 65% propeller efficiency, I computed that the additional induced drag required about 3 hp in level flight and about 6 hp in climb. This was at a 70% power setting of the Rotax 912 engine, which gives an output of 56 hp. So in cruise, more than 5% of the engine output was wasted due to the

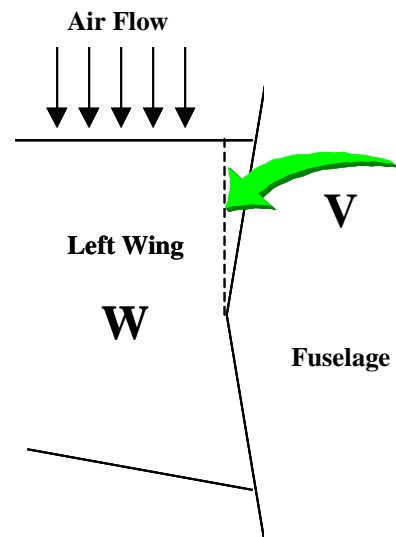


Figure 8. Airflow in Area of B

induced drag of the bulging-out fuselage over the wing. In climb, it was more than 10%. These numbers indicate that there is a significant loss of efficiency.

But more needs to be considered. Let us look at the area B of Figure 5, enlarged here in Figure 8.

The top surface of the left wing has been divided by a dashed line into the main area W and a triangular sliver V. Imagine the airflow across the main area W. As we have seen, that airflow is bent by the top surface of the wing and thus creates a low pressure over the wing. What happens to the airflow into the triangular area V? That air has nowhere to go but across the dashed line into W. Thus, the air of V is injected into the low-pressure air over W near the wing root. The result is an increase of the air pressure over W and, therefore, a reduction of the lift produced by W. To compensate for that loss of lift, one must increase the angle of attack of the wing, with corresponding increase of induced drag. Thus, V indirectly increases the induced drag of the wing. A rough estimation using volumes for the case of the 601HDS indicates that the loss of lift and the corresponding increase of induced drag are substantial.

We have seen that a plane with fuselage shaped as in Figure 5 has significant induced drag created directly or indirectly by the bulging-out of the fuselage over the wing. What is the cure? First, one should avoid such bulging-out. Just look at the RVs, where the fuselage sidewall over the wing is straight and at a 90 deg angle to



the wing spar. Second, if a plane does have a fuselage bulging out over the wing, one may want to consider a modification to alleviate the negative effects. In the case of the 601HDS, I made fiberglass fairings that, looking from above, attempt to simulate a straight fuselage. Photos taken by Marvin Brott show the shape of the fairings. Les Palmer worked on the surface finish until it became, well, perfect. Mel Asberry helped to mount the fairings on the plane.

The fairings solve the three problems mentioned at the beginning. (1) Small attitude changes no longer cause sudden deterioration of air speed. (2) Power-off glide is stable and the sink rate is much reduced. (3) The plane no longer requires nose-up attitude in level flight when heavily loaded. There are additional benefits, such as improved climb rate, increased cruise speed, and reduced stall speed.

We ran extensive "BEFORE" (prior to installation of the fairings) and "AFTER" (after installation of fairings)



tests. There are too many numbers to be included here, so I just listed a sample of the test data. The fuel tanks were filled with approximately 16 gal, which corresponds to 4+ hrs of endurance. By the way, capacity is 22 gal, which gives 6 hrs endurance. Temperature was around 60 deg F, and altitude for the tests was around 2,000-3,000 ft except for the ceiling test. We loaded the plane in three ways.

Case 1: total weight 860 lbs (pilot only).

Case 2: total weight 1,020 lbs (pilot and copilot).

Case 3: total weight 1,080 lbs (pilot, copilot, and 60 lbs baggage).

Power-off stall speed at 1,020 lbs: BEFORE 50 KIAS (kts indicated airspeed), AFTER 42 KIAS.

Power-off best glide at 1,020 lbs: BEFORE 65 KIAS with 1,000+ ft/min sink rate, AFTER 56 KIAS with 650 ft/min sink rate.

Best climb rate at 1,080 lbs: BEFORE 500 ft/min at 65 KIAS, AFTER 800 ft/min at 55 KIAS.

Low-power cruise speed at 1,080 lbs, running the Rotax 912 at 4,700 RPM or 65%, using 3.7 gal/hr: BEFORE 87 KTAS (= kts true airspeed), AFTER 92 KTAS.

Ceiling at 860 lbs: This could not be tested since the plane easily reaches 14,000 ft, the legal limit without oxygen. But we did test the climb rate right at 14,000 ft (15,500 density altitude) and full power: BEFORE 150 ft/min, AFTER 300 ft/min.

Amazing what a bit of fiberglass can do. Are further improvements possible for the 601HDS? Yes. But first we will enjoy summer flying.

FAA

DESIGNATED AIRWORTHINESS REP.
AVIATION SAFETY COUNSELOR
GROUND INSTRUCTOR
A & P MECHANIC

EAA

TECHNICAL COUNSELOR
FLIGHT ADVISOR
SAFETY OFFICER

MEL ASBERRY

2464 COUNTRY RD. 655
FARMERSVILLE, TX 75442-6014

972-784-7544
972-598-8458



**LONE STAR
PILOT SHOP
ADDISON AIRPORT
EARLETTE SHULTS**

OPEN:
M-F 9:30AM - 5:00PM
SAT 10:00AM - 3:00PM

4500 RATLIFF LANE, SUITE 119
DALLAS, TX 75248
972/250-6781 - FAX 972/407-9383



ATTORNEY-AT-LAW

FRED E. ZIMRING

5520 LBJ Freeway, Suite 340
Dallas, Texas 75240
Tel: 972-991-2277
Fax: 972-991-2279
Home: 972-231-7511

Member EAA Legal Advisory Council

Alpha and Omega Insurance Company



David M. Brown

Aircraft

Auto - Home - Boat - Motorhome

1930 E. Rosemeade Pkwy Cell 214 763-2387
Suite 208 Office 972 394-5763
Carrollton, TX 75007 Fax 972 395-7665

**DATA PLATES ENGRAVED
\$19.95+TAX**

For Information
SEND LARGE SELF ADDRESSED ENVELOPE
TO:
Richard Gent
PMB 108238
1001 N. Beckley
DeSoto, TX 75115

ALVIN BOYANTON
Manager / Vice President
(214) 637-3598
Fax (214) 688-0549



AIRCRAFT SUPPLY COMPANY

7204 PARWELK
(ANSON & HINES Near Boy Scout Bldg.)
DALLAS, TEXAS 75235
AN MS NAS HARDWARE % ACCESSORIES

FINA

Presents:
Jan Collmer
Aerobatics



EXTRA 300L
Low Level Acro Performance
• Torque Rolls
• Lomcevaks
• Snap roll on take off
and final approach
A Real Crowd Pleaser

Jan Collmer
14368 Proton Road
Dallas, TX 75244
(972) 233-1589
Fax (972) 233-0481

Aircraft Retrieval
Damaged Aircraft

Used Parts
Buy & Sell Problem



Stephen Smith
Salesman

(972) 227-1111
(800) 336-6399
FAX (972) 227-6176
www.asod.com

Classifieds

Aviation ads (For Sale, Wanted, Etc.) can be placed by Chapter 168 members free of charge.
Send to: Chapter 168 Newsletter, 1317 Seminole Drive, Richardson Texas 75080 or brott@mindspring.com

Airplanes For Sale:

Midget Mustang I, 1988, 312 TT, 152 SMOH on O-200. Full Electric, Garmin GPS, Terra Com, Transponder w/encoder. Complete with Nav lights and landing light. New Annual. New Paint – you pick the colors. \$26,500.

* Call David Brown 972-242-1014 or 214-763-2387 (9)

Starduster II, completed 1970, 466 totals Hrs A+E, repainted 1991.

* Call Ken Whitehead 972-529-9597 (7)

1958 Bonanza J-35: Only 3774 TT, only 180 SMOH on IO-470C engine and propeller. 9 out, 9 inside. \$23.3K worth of modifications, including 20 gal. each tip tanks, single piece windshield, Cleveland brakes, dual glide slope, DME, dual 720 transceivers. 150K cruise, 6 hours of fuel, \$65,000

* Call Dave Davidson (972) 530-4067 (5)

Wanted

Searching for a flyable Cessna 120 /140, Taylorcraft, Aeronca Chief, or Luscombe. Planes in need of TLC are preferred, if reasonably.

* Call Steve Ehlers (817) 731-6092 D (817) 346-9672 E

Services, Parts and Other:

Airspeed Indicator 3 1/8" dia Ranges Outside Scale 40-200 Mph, Inside Scale 40-170 Kts \$100.00 obo

Narco AT150 Transponder with tray and connector, cabled for A30 encoder. Yellow-tagged 96/11. \$600

Oil Cooler Harrison 8526258 (Cherokee 150 hp, etc) yellow-tag 96/6 \$ 250
*Call Monroe McDonald 214-352-1564. (2)

KR2-S Plans unused, cost \$245, sell for \$125.

*Call Sidney Winski 214 358-1639 (5)

MINI-MAX Dealer closeout – HI-max Zenoa engine 15 hr TT., Avid Flyer 90% complete, Rotax 503 dcdi, excellent fabric, an easy finish. Plans, parts, engines: 532 Rotax, Cuyana 430, to much to list

*Call Bill Price 214 369 6713 e-mail 2billp@airmail.net (4)

ASA CX-1 Pathfinder Flight Computer \$25.00

*Call Jim Quinly 972 233-3263 (1)

(2) **King KY-97A** 720 Channel TSO 14V radios brand new in original packaging complete with trays ready to be wired up. \$1,000 each new, will take \$900 each or best offer.

*Call Jon Staehling 972 205-4657 (1)

HANGAR ECHOES

Web Site Address:

EAA CHAPTER 168 OFFICERS

<http://www.vline.net/eaa168/news.htm>

President c-asberry@raytheon.com	Ann Asberry metro 972-784-7544
Vice President dcarte01@7-11.com	Dave Carter 903-326-7382
Secretary dcheek@nortelnetworks.com	David Cheek 972-272-7362
Treasurer genebs@wtd.net	Gene Spaulding 972-661-9229
Flight Advisors	
Mel Asberry m-asberry@ti.com	metro 972-784-7544
Mike Hoyer	972-771-8162
Brownie Seals	972-248-4335
Gene Spaulding genebs@wtd.net	972-661-9229
Technical Counselors	
Mel Asberry m-asberry@ti.com	metro 972-784-7544
Owen Bruce	972-231-3946
Steve Marchand	972-475-0571
Brownie Seals	972-248-4335

Board of Directors		
Jerry Bidle	jbidle@airmail.net	972-517-0946
Bo Bauereis	bauereis@swbell.net	972-529-2844
Bill Barrett		972-910-0427
Don Christiansen		972-298-6531
Bernie Cross	bjcii@swbell.net	972-712-1674
Ted Fontelieu	tfontelieu@netgenie.com	972-329-3940
Stephan Palstring		972-562-3077
David Pack	eagle376@swbell.net	972-723-0245
John Peyton		214-691-6643
Sid Smith		972-418-9717
Michael Stephan	mstephan@shr.net	972-857-3327
Advertising		
Bo Bauereis	bauereis@swbell.net	972-529-2844
Hanger Echoes Editors		
Marvin Brott	brott@mindspring.com	972-235-5552
Sam Cooper	scooper9@flash.net	972-424-6930
Michael Stephan	mstephan@shr.net	972-857-3327

Data Processing		
Jerry Mrazek	mrazek@flash.net	metro 817 265-0834
Librarian		
Michael Stephan	mstephan@shr.net	972-857-3327
Tool Custodian		
Vern Williams		972-484-7741
Fly-In Ground Control		
Chuck Farry		972-644-8748
Meeting Refreshments		
David Cheek		972-272-7362
Safety Officer		
Mel Asberry	m-asberry@ti.com	metro 972-784-7544
Young Eagles Coordinator		
Jim Quinn	jquinn2@swbell.net	972-788-2593

We would like to make you aware that as always, in past, present, and future, any communications issued by Experimental Aircraft Association, Chapter 168, Inc. regardless of the form, format, and/or media used which includes, but is not limited to, Hangar Echoes and audio/ video recordings is presented only in the light of a clearing house of ideas, opinions, and personal experience accounts. Anyone using ideas, opinions, information, etc. does so at their own discretion and risk. Therefore, no responsibility or liability is expressed or implied and you are without recourse to anyone. Any event announced and/or listed herein is done so as a matter of information only and does not constitute approval, sponsorship, involvement, control or direction of any event (this includes Oshkosh). Bottom line, we are responsible for nothing. Please read, listen, enjoy, and be careful out there.

HANGAR ECHOES

EXPERIMENTAL AIRCRAFT ASSOCIATION

DALLAS CHAPTER 168, P.O. BOX 168

ADDISON TEXAS 75001-0168

Dallas Chapter 168 Membership Application & Renewal Form

Application Status:

New Member: _____
Renewal _____
Info. Change _____

Membership dues for EAA Dallas Chapter 168 are \$15 for one year. Name tags available for \$6.

Make Checks Payable to:
EAA Dallas Chapter 168

Mail Application to:

EAA Dallas Chapter 168
P.O. Box 168
Addison, TX 75001-0168

National EAA Offices:

Experimental Aircraft Association
EAA Aviation Center
P.O. Box 3086
Oshkosh, WI 54903-3086

National EAA Membership:

(800) JOIN EAA (564-6322)
Phone (920) 426-4800
FAX (920) 426-6761

Please Print Clearly

Name: _____

Co-Pilot: (Spouse, Friend, Other) _____

Address. 1: (or Business Name) _____

Address. 2 _____

City: _____ **State:** _____ **Zip:** _____ **Mapsco#** _____

Phone: H: (____) ____ - _____ **W:** (____) ____ - _____

e-mail address: _____

EAA #: _____ (168 membership requires National EAA membership)

Pilot/A&P Ratings: _____

EAA Office (past or present) or other additional notes: _____

Notes: _____

I am interested in helping with: Fly Ins ____, **Programs** ____, **Newsletter** ____,

Young Eagles ____, **Officer Position** ____

Plane or Project (% complete) or Interests

Example

RV-6 (FLY)% (_____)%

Thunder Mustang (25)% (_____)%

LUSCOMBE 8E (INT)% (_____)%